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Eric R. Blomiley

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WELLS ST. JOHN P.S.
601 W. FIRST AVENUE, SUITE 1300
SPOKANE, WA 99201

EXAMINER

SONG, MATTHEW J

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claim 56 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 56 recites, "the susceptor is configured to define individual ring portions aligned with the annular regions of the substrate" in lines 1-2. There is no support for the susceptor being configured to define individual ring portions. Applicant merely teaches an array of conduits arranged in concentric rings and the rings are diagrammatically bound by dashed lines. (See [0043] of applicant's published application). The ring portions claims are merely dashed lines on a diagram.

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 56 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as

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the invention. Claim 56 recites, "the susceptor is configured to define individual ring portions aligned with the annular regions of the substrate" in lines 1-2. It is unclear how a susceptor is configured to define ring portions. Applicant merely teaches an array of conduits arranged in concentric rings and the rings are diagrammatically bound by dashed lines. (See [0043] of applicant's published application). The ring portions claims are merely dashed lines on a diagram and based on the location of the conduits. Therefore, the claim is interpreted by the examiner to mean that conduits are located in the susceptor.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

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6. Claims 52-53, 55 and 57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted Prior Art (AAPA) in view of De Boer (US 2006/0057826 A1) and Hegedus (US 6,079,874).

Applicant's admitted prior art (AAPA) teaches a susceptor **12** which receives a wafer substrate **14** and the substrate is received within a pocket or recess **16** of the susceptor to elevationally and laterally retain the substrate in a desired position ([0003] and Fig 1-3 which are labeled as prior art), this clearly suggests a susceptor defining a recess above a trough. AAPA also teaches the susceptor can be heated from the front and back side ([0004] and Fig 2). AAPA also teaches the susceptor is typically caused to rotate during deposition.

AAPA does not teach a radiation detector and a plurality of rotating and stationary radiation conduit.

Do Boer teaches a deposition apparatus comprising a rotating substrate susceptor ([0039], this clearly suggests applicant's substrate susceptor being configured to spin while the substrate is received therein and to thereby spin the substrate. Do Boer also teaches heating lamps and heating the wafer to approximately the same temperature as the susceptor ([0019] and [0030]). Do Boer also teaches optical fibers are connected to a measuring device for determining temperature by measuring radiation from the backside of the wafer ([0009] and [0033]-[0036]), this clearly suggests applicant's radiation detector. Do Boer also teaches a plurality of rotating optical fibers **37,38** extending through the susceptor (Fig 3C and [0042]) and additional fibers are possible ([0036]), this clearly suggests applicant's plurality of outer rotating radiation conduits being associated with an outer of the annular regions. The plurality of rotating conduits are channeled into a single output to the control system (Fig 3C), this clearly suggests applicant's

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channeling radiation to a single stationary radiation conduit. Do Boer teaches one optical fiber inserted through the susceptor monitors the center of the wafer and a second optical fiber monitors the edge of the wafer ([0036]), this clearly suggests a susceptor with a plurality of annular regions extending radially inwardly of one another.

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify AAPA with Do Boer's temperature measuring device to improve the quality of deposited epitaxial layer. ('826 [0022]-[0027]).

The combination of AAPA and Do Boer does not teach stationary radiation conduits where a plurality of outer rotating radiation conduits being configured to channel radiation to only one of the stationary radiation conduits.

In an apparatus for accurately measuring a temperature of a substrate, note entire reference, Hegedus teaches a first and second probe to receive radiation from a substrate during thermal processing and a junction receives and combines radiation from the first and second probes (Abstract). Hegedus also teaches optic cables **202, 206** are provided to a optical junction **130** which combines and averages their outputs and the average output is transmitted via another optical cable **212** (col 3, ln 50-65). The junction where two outputs are combined into a single output clearly suggests applicant's stationary radiation conduit and the plurality of conduits are configured to channel radiation to only one of the stationary radiation conduits. Hegedus also teaches the radiation is combined to provide an accurate representation of the temperature of a local region of the substrate by compensating for a temperature gradient between the support structure and the substrate (Abstract). Hegedus teaches a plurality of outer conduits **202, 202', 206, 206'** and a plurality of junctions where the outputs are combined into a single output **212,**

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212' (Fig 1), which clearly suggests applicant's plurality of conduits and plurality of stationary radiation conduits because the junctions are stationary. Hegedus also teaches temperatures at localized regions 109A-109E of the substrate are measured by a plurality of temperature probes and the probes are spaced 180 degrees apart on an imaginary circle concentric with the substrate (col 3, ln 1-67 and Fig 3), this clearly suggests a plurality of annular regions extending radially inwardly of one another.

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of AAPA and Do Boer by using a plurality of radiation conduits where the outputs are combined and averaged at a stationary conduit which are placed on an imaginary circle concentric with the substrate, as taught by Hegedus, to provide an accurate representation of the temperature by averaging a plurality of inputs.

Referring to claim 53, the combination of AAPA, De Boer and Hegedus teaches fibers ([0042]).

Referring to claim 55, the combination of AAPA, De Boer and Hegedus teaches a fiber at the center and one at the outer periphery, this clearly suggests the outer rotating conduits configured to align with outermost annular region and the inner rotating conduits configured to align with an inner most annular region, and the stationary conduits are aligned inwardly of the outermost region. ('826 Fig 3C). Also, additional fibers and conduits would have been obvious to one of ordinary skill in the art to monitor additional annular regions of the substrate, as suggested by De Boer ('826 [0036]).

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Referring to claim 57, the combination of AAPA, De Boer and Hegedus teaches three annular regions associated with the temperature probes ('874 Fig 3 126E-126A, 126D-126B and 126C)

7. Claim 54 is rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted Prior Art (AAPA) in view of De Boer (US 2006/0057826 A1) and Hegedus (US 6,079,874) as applied to claims 52-53, 55 and 57 above, and further in view of Doitel et al (US 5,944,422).

The combination of AAPA, Do Boer and Hegedus teaches all of the limitations of claim 54, as discussed previously, except the rotating radiation conduits are within a shaft, wherein the stationary radiation conduits are within a receptor, and further comprising a coupling between the shaft and receptor that enables vacuum to be maintained within the shaft while the substrate is spinning.

In an apparatus for measuring temperature, note entire reference, Doitel et al teaches an optical fiber **30** extends for the complete length of a shaft **12** and terminates adjacent to a thermal detector assembly **31** (col 3, ln 1-65), this clearly suggests applicant's receptor. Doitel et al also teaches a vacuum seal at the lower end of the shaft (col 2, ln 60-67), this clearly suggests applicant's coupling enables vacuum to be maintained in the shaft. Doitel et al teaches the shaft is enclosed by a liner to protect it from the deposition of substances (col 4, ln 20-40) and the shaft is water cooled (col 2, ln 40-67). Doitel et al also teaches processing of the wafer may involve rotation of the wafer (col 5, ln 50-55), this clearly suggests applicant's vacuum is maintained within the shaft while the substrate is spinning.

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It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of AAPA, Do Boer and Hegedus by enclosing the optical fibers in a shaft, as taught by Doitel et al, to protect the optical fiber from the deposition of gases and high temperatures.

Response to Arguments

8. Applicant's arguments with respect to claims 52-55 and 57 have been considered but are moot in view of the new ground(s) of rejection.

9. Applicant's arguments filed 10/23/2008 have been fully considered but they are not persuasive.

Applicant's argument that the prior art does not teach a susceptor defined with a plurality of annular regions is noted but not found persuasive. First, Applicant merely teaches an array of conduits arranged in concentric rings and the rings are diagrammatically bound by dashed lines. (See [0043] of applicant's published application). The ring portions claims are merely dashed lines on a diagram and in the broadest embodiment only one conduit is associated with each regions, See Figure 10. Do Boer teaches one optical fiber inserted through the susceptor monitors the center of the wafer and a second optical fiber monitors the edge of the wafer ([0036]), this clearly suggests a susceptor with a plurality of annular regions (center and outer) extending radially inwardly of one another. Hegedus also teaches temperatures at localized regions 109A-109E of the substrate are measured by a plurality of temperature probes and the probes are spaced 180 degrees apart on an imaginary circle concentric with the substrate (col 3, ln 1-67 and

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Fig 3), this clearly suggests a plurality of annular regions extending radially inwardly of one another (109A-109E, 109B-109D, and 109C). Therefore, the prior art clearly suggests a susceptor with a plurality of annular regions, where each region is defined by a temperature probe extending through the susceptor.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Ries et al (US 2001/0037761 A1) teaches a susceptor with a recess and a trough. (Fig 2).

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

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12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to MATTHEW J. SONG whose telephone number is (571)272-1468. The examiner can normally be reached on M-F 9:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Kornakov can be reached on 571-272-1303. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Matthew J Song
Examiner
Art Unit 1792

MJS
January 21, 2009

/Robert M Kunemund/

Primary Examiner, Art Unit 1792